CLAIMS

1.   A transmission control method for use in a communication network, comprising:

generating first probability distribution data showing incidence probabilities of data block round trip times;

transmitting sequentially a plurality of data blocks from a sender device to a receiver device;

retransmitting, from said sender device, a data block, from among said plurality of data blocks, for which no acknowledgement is received and initializing a time keeping means for measuring an elapsed time;

obtaining, upon receiving an acknowledgement signal from said receiver device, said elapsed time measured by said time keeping means; and

estimating whether said acknowledgement signal acknowledges receipt of one of said plurality of data blocks on the basis of a value of said obtained elapsed time and said first probability distribution,

wherein said transmitting step includes further transmitting a data block subsequent to said transmitted plurality of data blocks when it is estimated that in said estimating step that said acknowledgement signal acknowledges reception of one of said plurality of data blocks.

2.   A data transmission method according to Claim 1, further comprising:

generating second probability distribution data showing incidence probabilities of said elapsed time using said obtained value of said elapsed time when it is determined that said estimation performed in said estimating step is correct,

wherein said estimating step includes performing said estimation on the basis of said obtained value of said elapsed time, and said first and second probability distribution data.

3.   A communication device comprising:

first generation means for generating first probability distribution data showing incidence probabilities of data block round trip times;

transmission means for transmitting sequentially a plurality of data blocks to a receiver device;

time keeping means for measuring an elapsed time;

retransmission means for retransmitting a data block, from among said plurality of data blocks, for which no acknowledgement is received and initializing said time keeping means;

obtaining means for obtaining, upon receiving an acknowledgement signal from said receiver device, said elapsed time measured by said time keeping means; and

estimation means for estimating whether said acknowledgement signal acknowledges receipt of one of said plurality of data blocks on the basis of a value of said obtained elapsed time and said first probability distribution,

wherein said transmitting means further transmits a data block subsequent to said transmitted plurality of data blocks when it is estimated in said estimation step that said acknowledgement signal acknowledges receipt of one of said plurality of data blocks.

4.   A communication device according to Claim 3,
wherein said plurality of data blocks is transmitted to a plurality of said receiver devices;

wherein said first generation means generates said first probability distribution data for each of a plurality of connections established with said plurality of receiver devices; and

wherein said estimation means performs said estimation, upon receiving an acknowledgment from one of said plurality of receiver devices, on the basis of said first probability distribution data generated for one of said plurality of connections that is established with said one of said plurality of receiver devices.

5.   A communication device according to Claim 3,

wherein said plurality of data blocks is transmitted to a plurality of said receiver devices each belonging to different subnetworks;

wherein said first generation means generates said first probability distribution data for each of said subnetworks; and

wherein said estimation means performs said estimation, upon receiving an acknowledgment from one of said plurality of receiver devices, on the basis of said first probability distribution data generated for one of said subnetworks to which said one of said plurality of receiver devices belongs.

6.   A communication device according to any one of Claims 3-5,

wherein said first probability distribution data is statistical information obtained before transmitting said plurality of data blocks; and

wherein said first generation means generates said first probability distribution data by updating said obtained statistical information after transmission of said plurality of data blocks is started.

7.   A communication device according to any one of Claims 3-5,

wherein said first probability distribution data is statistical information obtained before starting communication for transmitting said plurality of data blocks; and

wherein said first generation means generates said first probability distribution data by updating said statistical information after starting communication for transmitting said plurality of data blocks.

8.   A communication device according to Claim 3, further comprising:

second generation means for generating second probability distribution data showing incidence probabilities of said elapsed time using said obtained value of said elapsed time when it is determined that said estimation performed by said estimation means is correct; and

wherein said estimating means performs said estimation on the basis of said obtained value of said elapsed time, and said first and second probability distribution data.

9.   A communication device according to Claim 8,

wherein said second generation means determines that said estimation performed by said estimation means is correct when receiving at least two acknowledgment signals requesting said subsequent data block.

10.   A communication device according to Claim 8,

wherein said plurality of data blocks is transmitted to a plurality of said receiver devices;

wherein said first and said second generation means generate said first and said second probability distribution data, respectively, for each of a plurality of connections established with said plurality of receiver devices; and

wherein said estimation means performs said estimation, upon receiving an acknowledgment from one of said plurality of receiver devices, on the basis of said first and said second probability distribution data generated for one of said plurality of connections that is established with said one of said plurality of receiver devices.

11.   A communication device according to Claim 9,

wherein said plurality of data blocks is transmitted to a plurality of said receiver devices;

wherein said first and said second generation means generate said first and said second probability distribution data, respectively, for each of a plurality of connections established with said plurality of receiver devices; and

wherein said estimation means performs said estimation, upon receiving an acknowledgment from one of said plurality of receiver devices, on the basis of said first and said second probability distribution data generated for one of said

plurality of connections that is established with said one of said plurality of receiver devices.

12. A communication device according to Claim 8,

wherein said plurality of data blocks is transmitted to a plurality of said receiver devices each belonging to different subnetworks; .

wherein said first and said second generation means generate said first and said second probability distribution data, respectively, for each of said subnetworks; and

wherein said estimation means performs said estimation, upon receiving an acknowledgment from one of said plurality of receiver devices, on the basis of said first and said second probability distribution data generated for one of said subnetworks to which said one of said plurality of receiver devices belongs.

13. A communication device according to Claim 9,

wherein said plurality of data blocks is transmitted to a plurality of said receiver devices each belonging to different subnetworks;

wherein said first and said second generation means generate said first and said second probability distribution data, respectively, for each of said subnetworks; and

wherein said estimation means performs said estimation, upon receiving an acknowledgment from one of said plurality of receiver devices, on the basis of said first and said second probability distribution data generated for one of said subnetworks to which said one of said plurality of receiver devices belongs.

14. A communication device according to any one of Claims 8-13,

wherein said first and said second probability distribution data are statistical information obtained before transmitting said plurality of data blocks; and

wherein said first and said second generation means generate said first and said second probability distribution data, respectively, by updating said empirically obtained statistical information after transmission of said plurality of data blocks is started.

15.   A communication device according to any one of Claims 8-13,

wherein said first and said second probability distribution data are statistical information obtained before starting communication for transmitting said plurality of data blocks; and

wherein said first and said second generation means generate said first and said second probability distribution data, respectively, by updating said statistical information after starting communication for transmitting said plurality of data blocks.

16.   A communication system comprising:

generation means for generating first probability distribution data showing incidence probabilities of data block round trip times;

transmission means for transmitting sequentially a plurality of data blocks from a sender device to a receiver device;

time keeping means for measuring an elapsed time;

retransmission means for retransmitting a data block, from among said plurality of data blocks, for which no acknowledgement is received and initializing said time keeping means;

obtaining means for obtaining, upon receiving an acknowledgement signal from said receiver device, said elapsed time measured by said time keeping means; and

estimation means for estimating whether said acknowledgement signal acknowledges receipt of one of said plurality of data blocks on the basis of a value of said obtained elapsed time and said first probability distribution,

wherein said transmitting means further transmits a data block subsequent to said transmitted plurality of data blocks when it is estimated that by

said estimation step that said acknowledgement signal acknowledges reception of one of said plurality of data blocks.

17.   A program product for causing a computer to execute:

a process of generating first probability distribution data showing incidence probabilities of data block round trip times;

a process of transmitting sequentially a plurality of data blocks from a sender device to a receiver device;

a process of retransmitting, from said sender device, a data block, from among said plurality of data blocks, for which no acknowledgement is received and initializing a time keeping means for measuring an elapsed time;

a process of obtaining, upon receiving an acknowledgement signal from said receiver device, said elapsed time measured by said time keeping means; and

a process of estimating whether said acknowledgement signal acknowledges receipt of one of said plurality of data blocks on the basis of a value of said obtained elapsed time and said first probability distribution, wherein said transmitting process further transmits a data block subsequent to said transmitted plurality of data blocks when it is estimated by said estimating process that said acknowledgement signal acknowledges receipt of one of said plurality of data blocks.